

any time, or to any degree he may desire, and thus secure the original length of the extremity after a firm union of the fragments has been effected. This was considered impossible in oblique fractures when the ordinary methods of treatment were practised.

3. The *perfect quietude* of the fragments at the seat of fracture, the absence of irritation and irritative fever, the great comfort enjoyed by the patient, consequently his non-interference with the retentive apparatus, will secure union of the fractured bone in at least twenty-five per cent. less time than by the usual methods of treatment.

4. The adhesive plaster counter-extending bands require no trouble by way of readjustment every day or two, which is so necessary in the old method.

5. If the adhesive plaster be carefully applied, the bandages and splints readjusted when they become relaxed by the diminution of the swelling of the limb, and osseous union is about taking place, the patient will require but little attention afterwards. In consequence of the above facts, this method is best suited to country and all private practice, especially when the attending surgeon is not constantly at hand.

---

ART. IX.—*On the Poisonous Effects resulting from the Employment of Arsenical Preparations in the Arts.* By M. CAREY LEA, ESQ.

MUCH attention has been attracted of late years in Europe to the increasing use of arsenical pigments in matters connected with domestic economy. Formerly, when Scheele's green and orpiment were the chief colouring substances into the composition of which arsenic entered, their comparatively limited use rendered their poisonous character of less importance; but since the discovery of the substance sold under the name of Schweinfurt green, Swedish green, Mitis green, &c., the case is different. This substance, the aceto-arsenite of copper, obtained by boiling together green verdigris and white arsenic, possesses the finest colour of all known green pigments: this fact, together with its easy production from inexpensive materials, has caused a great extension of its use, and it is time that the impropriety of employing so deleterious a substance should be brought home to those who use it in their manufactures.

The immense extension which its employment has received, even in this country, may be judged of by the following facts:—

The author had recently two rooms papered with different green papers, obtained from different manufacturers. On examination it proved that the green colouring matter in both papers was arsenical. The border was then examined with a like result. The author procured three different specimens

of green material prepared for window shades; all three were found to be heavily charged with arsenic, so much so that from about two square inches of one of them no less than six grains of arsenite of silver were prepared, by precipitating the arsenious acid with nitrate of silver. As these materials varied not only in intensity, but in colour also, the arsenical pigment is no doubt often mixed with other colouring matters—a fact to be borne in mind in making examinations to detect its presence.

Not only the above-mentioned manufactures, but many others, are coloured with the same substance. It is largely used in dyeing carpets. The large pasteboard boxes, so much used in stores for containing fine fabrics, and those employed for keeping documents and papers, are almost always covered with paper coloured green by arsenic. So with the green shades for gas lights, and when the eye becomes acquainted with the peculiar shade of Schweinfurt green, it is surprising in how many things it is detected.

When these considerations are represented to those who employ this pigment in their manufactures, they are met by a denial of its bad effects, and by an unsupported assertion that no evil results from its employment. The answer to this is, that no doubt much of the evil resulting from arsenic is attributed to other causes. The quantity taken into the system in a short period is but small; but the gradually cumulative effect of constant small inhalations of arsenic over a space perhaps of years, must be highly injurious. Facts are not wanting, however, but, on the contrary, are present in abundance, to prove direct evil effects clearly and immediately resulting from this cause. The author was informed by a journeymen paper-hanger that he never put up certain shades of green paper without having his nose, and often his whole face, swelled. In a recent medical journal a case is mentioned where several children fell into a decline, and exhibited such strong symptoms of arsenical poisoning that the physician directed them to be removed to another room, where they speedily recovered. On examination, the paper of the room originally occupied by them was found to contain arsenic. In a recent number of the *London Chemical News* a case is related by the sufferer himself, who, moreover, states he was informed by paper-hangers that no one could have anything to do with that description of green paper without irritation of the mucous membranes of the throat and fauces. Finally, the author subjoins a few lines translated from Dr. Otto, than whom there can be no higher authority on the subject of poisoning by arsenic.

“Schweinfurt green is frequently used for colouring carpets and window shades; but is, on account of its poisonous character, a very dangerous colour. Apart from the poisonous dust which window shades especially produce, the pigment in moist situations disengages deadly arseniuretted hydrogen. Swedish green, Neuwied green, Mitis green, and many other beautiful green pigments, are all Schweinfurt green mixed with colourless substances.

“The use of all these arsenical colouring matters is forbidden in Prussia by law.”—*Graham-Otto*, third edition, vol. iii. p. 477.

Amongst the many reactions which afford decisive proofs of the presence

of arsenic, the following will be found very convenient for detecting it in the fabrics in common use in the household, such as carpets, wall papers, window shades, curtains, &c. :—

The suspected substance is immersed in liquid ammonia, and allowed to remain in contact with it for some hours. The resulting liquid is then to be filtered or decanted, and treated with pure nitric acid until it is rendered perfectly neutral. A very slight alkaline reaction is not important; but the liquid should not be acid. Any trace of arsenic is then made evident by the addition of nitrate of silver, which causes an immediate yellow precipitate.

The only substance which affords a precipitate liable to be mistaken for that of arsenious acid is phosphoric acid, which also with nitrate of silver gives a lemon yellow precipitate. Phosphoric acid is, however, not likely to be present in any of the above-mentioned substances; but when a yellow precipitate is obtained it is easy to decide whether it consists of phosphate or arsenite of silver.

For this purpose a tube of glass, which should be free from lead, having about a quarter of an inch in internal diameter, is to be drawn out so that its extremity, for about an inch in length, may have an internal diameter at about one-fifteenth of an inch. The yellow precipitate having been washed and dried, a portion of it, about as large as a large pin's head, is placed at the bottom (previously closed in the lamp), and over it a fragment of charcoal. The charcoal must not be in powder, otherwise it is liable to be carried into the cool part of the tube, and thus mask the result; it must also be thoroughly burnt. The author has found that by cutting fragments of the stems of lucifer matches about an inch in length, placing them in a test tube and applying heat until no more gases are disengaged, a pure, soft, and flexible charcoal is obtained, of exactly the shape requisite for the use intended.

The charcoal being adjusted, the narrow part of the tube is placed on the flame of a spirit lamp, so that the charcoal, and not the substance, shall be heated. When the charcoal is red hot, the tube is inclined from its previous horizontal position, so as to bring the point of the tube where the substance lies, into the flame, keeping still the charcoal in it also. The silver salt is immediately decomposed. If it contain arsenious acid, the latter is immediately reduced by the charcoal, and forms a grayish-black ring in the cool part of the tube. Very good figures, illustrating the operation, will be found in Graham-Otto, *Lehrbuch*, vol. iii. p. 508.

The use of arsenic is now obtaining so dangerous an extension in manufactures, that the public have a right to ask for protection by legislative enactment, which should without delay be applied to put a stop to this reckless traffic.